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and the conclusion reached is that the fusion hypothesis is the most tenable; that is, the two lateral cotyledons of primitive angiosperms have become phylogenetically fused in monocotyledons, and the result appears as a terminal member. The anatomical proofs of this position are fairly well known and seem cogent. The final question asked is as to the cause of fusion, and the answer is, the geophyllous habit of the primitive monocotyledons. The author recognizes the fact that there are other distinctive features of monocotyledons which geophily cannot be called upon to explain, but these are "departures from the primitive type."

To boil it all down: the angiosperms are monophyletic; the monocotyledons are derived from the primitive dicotyledonous stock; the terminal "cotyledon" is a historical fusion of two lateral cotyledons, which was induced by geophily; and the other characters of monocotyledons remain to be explained.—J. M. C.

Polar conjugation in angiosperms.—Recently¹⁷ PORSCH attempted to explain the embryo sac and double fertilization in angiosperms. He holds that the two synergids are homologous with the neck canal cells of the gymnosperm archegonium (as to what gymnosperm has two neck canal cells, we are left in doubt); that the oospheres of gymnosperms and angiosperms are homologous; that the upper polar nucleus is homologous with the ventral canal cell of the gymnosperm archegonium; and that the antipodal end of the angiosperm sac is the equivalent of the micropylar end. The triple fusion results from the essentially female character of the polars.

It is with considerable surprise that we find an observer so acute as SCHAFFNER¹⁸ writing that the view of PORSCH in regard to these homologies has much in its favor, and that his interpretation of the triple fusion seems correct. That the eggs of gymnosperms and angiosperms are homologous, no one denies; but the other homologies are so inaccurate that to note them at all seems useless. In following the reduction of the archegonium, one notes in the bryophytes a shortening of the neck and a diminution in the number of neck canal cells. In the lower Filicineae there are two neck canal cells separated by a wall; in the higher Filicineae there is one binucleate neck canal cell, the wall always failing to develop. In the Hydropteridineae even the nuclear division fails to take place and there is only one small, uninucleate neck canal cell; while in the gymnosperms there is no neck canal cell at all. In some gymnosperms there is a ventral canal cell, separated from the egg by a wall; but in more cases there is only a nuclear division without the formation of a wall, and in *Torreya* even the nuclear division is suppressed. In the Gnetales we note the disappearance of even the archegonium. Recalling such a series, it is difficult to understand how anyone could propose such homologies as those suggested by PORSCH.—CHARLES J. CHAMBERLAIN.

¹⁷ PORSCH, OTTO, Versuch einer phylogenetischen Erklärung des Embryosackes und der doppelten Befruchtung der Angiospermen. Jena: Gustav Fischer. 1907.

¹⁸ SCHAFFNER, JOHN H., On the origin of polar conjugation in the angiosperms. Ohio Naturalist 8:255-258. 1908.